

WE CLAIM:

1. A method of making soot from which an optical fiber preform is made, said method comprising the steps of:
- 5 a) atomizing a non-aqueous liquid reactant and an aqueous solution to form an aerosol comprising numerous liquid droplets,
- b) delivering said aerosol into a combustion zone; and
- c) reacting said aerosol in a flame provided at said combustion zone to form finely divided glass soot particles.
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2. The method as claimed in claim 1 wherein said non-aqueous liquid reactant comprises a non-aqueous solution.
3. The method as claimed in claim 1 further comprising the step of
- 15 delivering said non-aqueous liquid reactant and said aqueous solution to a single burner assembly prior to atomizing said non-aqueous liquid reactant and said aqueous solution.
4. The method as claimed in claim 1, wherein prior to step a), the method further comprises the steps of:
- 20 delivering said non-aqueous liquid reactant to a first burner assembly; and
- delivering said aqueous solution to a second burner assembly spaced from said first burner assembly.
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5. The method as claimed in claim 4 further comprising the steps of:
- atomizing said non-aqueous liquid reactant at said first burner assembly to form a first aerosol; and
- atomizing said aqueous at said second burner assembly, to form a
- 30 second aerosol.
6. The method as claimed in claim 5 further comprising the steps of:

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reacting said first aerosol in a first flame produced adjacent said first burner assembly; and

reacting said second aerosol in a second flame produced adjacent said second burner assembly.

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7. The method as claimed in claim 1 wherein said non-aqueous liquid reactant comprises at least one precursor and at least one dopant.

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8. The method as claimed in claim 1 wherein said non-aqueous liquid reactant comprises a siloxane, and wherein said aqueous solution comprises a salt.

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9. The method as claimed in claim 8 wherein said salt is selected from the group consisting of alkali metal nitrate, alkali metal carbonate, alkali metal sulfate, alkali metal acetate, alkaline earth metal nitrate, alkaline earth metal carbonate, alkaline earth metal sulfate, alkaline earth metal acetate, barium nitrate, barium acetate, barium chloride, strontium nitrate, strontium acetate, strontium chloride, antimony nitrate, antimony acetate, lead nitrate, lead carbonate, lead sulfate, lead acetate, lanthanum nitrate, lanthanum carbonate, lanthanum sulfate, lanthanum acetate, cobalt nitrate, cobalt acetate, cobalt chloride, neodymium nitrate, neodymium chloride, potassium nitrate, potassium chloride, praseodymium nitrate, cesium nitrate, cesium chloride, cesium sulfate, cesium hydroxide, calcium nitrate, calcium chloride, aluminum nitrate, sodium nitrate, sodium chloride, erbium chloride, and erbium sulfate.

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10. The method as claimed in claim 9 wherein said non-aqueous liquid reactant further comprises a dopant.

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11. A process for making an optical fiber preform, said process comprising the steps of:

a) delivering a non-aqueous liquid reactant and an aqueous solution to a burner assembly;

b) discharging said non-aqueous liquid reactant and said aqueous solution from said burner assembly into a flame;

c) reacting said non-aqueous liquid reactant and said aqueous solution in said flame to produce soot; and

d) depositing said soot onto a rotating mandrel.

12. The process of claim 11 wherein step b) includes the step of atomizing said non-aqueous liquid reactant and said aqueous solution to form an aerosol comprising a plurality of non-aqueous liquid reactant droplets mixed with a plurality of liquid aqueous solution droplets.

13. The process of claim 12 wherein the step of atomizing occurs as said non-aqueous liquid reactant and said aqueous solution are discharged from said burner assembly.

14. The process of claim 11 wherein said burner assembly comprises a first burner assembly and a second burner assembly spaced from said first burner assembly, and wherein said non-aqueous liquid reactant is discharged from said first burner assembly as a first aerosol comprising a plurality of non-aqueous liquid reactant droplets, and wherein said aqueous solution is discharged from said second burner assembly as a second aerosol comprising a plurality of liquid aqueous solution droplets.

15. The process of claim 14 wherein said flame comprises a first flame adjacent said first burner assembly and a second flame adjacent said second burner assembly, and wherein said first aerosol is reacted in said first flame, and wherein said second aerosol is reacted in said second flame.

16. The process as claimed in claim 11 wherein said non-aqueous liquid reactant comprises at least one precursor and at least one dopant.

17. The method as claimed in claim 11 wherein said non-aqueous liquid reactant comprises a siloxane, and wherein said aqueous solution comprises a salt.

18. The method as claimed in claim 17 wherein said salt is selected from the group consisting of alkali metal nitrate, alkali metal carbonate, alkali metal sulfate, alkali metal acetate, alkaline earth metal nitrate, alkaline earth metal carbonate, alkaline earth metal sulfate, alkaline earth metal acetate, barium nitrate, barium acetate, barium chloride, strontium nitrate, strontium acetate, strontium chloride, antimony nitrate, antimony acetate, lead nitrate, lead carbonate, lead sulfate, lead acetate, lanthanum nitrate, lanthanum carbonate, lanthanum sulfate, lanthanum acetate, cobalt nitrate, cobalt acetate, cobalt chloride, neodymium nitrate, neodymium chloride, potassium nitrate, potassium chloride, praseodymium nitrate, cesium nitrate, cesium chloride, cesium sulfate, cesium hydroxide, calcium nitrate, calcium chloride, aluminum nitrate, sodium nitrate, sodium chloride, erbium chloride, and erbium sulfate.

19. An optical fiber preform formed by the process of :

a) delivering a non-aqueous liquid reactant and an aqueous solution to a burner assembly;

b) discharging said non-aqueous liquid reactant and said aqueous solution from said burner assembly into a flame as an aerosol comprising a plurality of non-aqueous liquid reactant droplets and a plurality of liquid aqueous solution droplets;

c) reacting said plurality of non-aqueous liquid reactant droplets and said plurality of liquid aqueous solution droplets in said flame to produce soot; and

d) depositing said soot onto a target.

20. A method of making soot from which an optical fiber preform is made, said method comprising the steps of:

a) atomizing an aqueous solution with a gas at a first burner assembly to form an aerosol comprising a plurality of droplets ranging in size from about 10 microns to 200 microns;

b) vaporizing a reactant for delivery to a second burner assembly;
and

c) reacting the vaporous reactant and the aerosol within a combustion zone adjacent the first and second burner assemblies to form at least one soot stream.

21. The method as claimed in claim 20 wherein said reactant is selected from the group consisting of a halide-based silicon containing compound and a halide-free silicon-containing compound.

22. The method as claimed in claim 20 wherein said aqueous solution comprises a salt selected from the group consisting of alkali metal nitrate, alkali metal carbonate, alkali metal sulfate, alkali metal acetate, alkaline earth metal nitrate, alkaline earth metal carbonate, alkaline earth metal sulfate, alkaline earth metal acetate, barium nitrate, barium acetate, barium chloride, strontium nitrate, strontium acetate, strontium chloride, antimony nitrate, antimony acetate, lead nitrate, lead carbonate, lead sulfate, lead acetate, lanthanum nitrate, lanthanum carbonate, lanthanum sulfate, lanthanum acetate, cobalt nitrate, cobalt acetate, cobalt chloride, neodymium nitrate, neodymium chloride, potassium nitrate, potassium chloride, praseodymium nitrate, cesium nitrate, cesium chloride, cesium sulfate, cesium hydroxide, calcium nitrate, calcium chloride, aluminum nitrate, sodium nitrate, sodium chloride, erbium chloride, and erbium sulfate.